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Brian Mossman
Boeing Realty Corporation
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Building 1A MCD001-0097
Long Beach, CA 90846

NO FURTHER ACTION FOR SHALLOW SOILS, BOEING REALTY CORPORATION, FORMER C-6 FACILITY, PARCEL C, 19503 NORMANDIE AVENUE, LOS ANGELES (FILE NO. 95-036)

Dear Mr. Mossman:

We have reviewed the "Soil Investigation, Shallow Soil Remediation and Screening Level Risk Assessment" (Report) dated March 13, 2002, prepared by Haley & Aldrich. The following information is presented in the Report:

1. The former Boeing C-6 aircraft manufacturing facility began operation in the early 1940's. The C-6 facility consists of approximately 170 acres and was used for aluminum production, aircraft parts manufacturing and warehousing. All operations ceased about 1992 and all buildings and associated surface and subsurface structures have been removed. The former C-6 facility has been subdivided into Parcels A, B, C and D. Boeing has completed the soil investigation at each of the four parcels and has received shallow soil (ground surface to 12 feet below ground surface (BGS)) closure for Parcels A, B and D. Redevelopment of Parcels A and B has been completed and redevelopment of Parcel D is underway.

2. Parcel C is approximately 50.5 acres and included Buildings 1, 2, 3, 19, 20, 32, 36, and 66. Building 1 was approximately 250,000 square feet and was originally used as a carbon baking area when the facility was used as an aluminum production plant. This building was subsequently used as a parts and records storage warehouse. Building 2 was approximately 1,000,000 square feet and was used for aircraft assembly and a parts storage warehouse. Building 3 was approximately 168,000 square feet and housed administrative offices and laboratories. Building 19 was approximately 7,500 square feet and housed the security office and emergency services for the facility. Building 20 served as the vehicle maintenance area. Building 32 contained the cafeteria and meeting hall. Building 36 was approximately 6,000 square feet and was used as a paint and solvent storage area. Building 66 was approximately 200,000 square feet and was used as a warehouse.

3. The Parcel C soil investigation focused on 233 environmental features identified during the review of historical documents, and known and suspected areas of contamination. In addition, open areas where no specific environmental features were known or suspected (such as parking lots and large interior spaces) were also targeted for investigation with numerous soil borings and soil gas sample locations. The comprehensive soil investigation of the shallow (0 to 12 feet BGS) and deep soils has

8. The site has been completely re-graded and approximately 250,000 cubic yards of clean imported fill material has been placed onsite. The current ground surface is from 3 feet lower to 5.5 feet higher than the pre-grading ground surface elevation.

Based upon the extensive soil investigation, extensive shallow soil remediation, site-specific risk assessment, the restricted future use of the land for commercial/industrial uses, and with the provision that the information provided to this agency is accurate and representative of site conditions, we have determined that no further action is necessary for the shallow soils at Parcel C. However, if additional contaminated soil is encountered at within Parcel C during future site development activities the Regional Board must be notified within 72 hours. Boeing is required to continue remediation of contamination in deep soils and continue groundwater investigation, monitoring and/or remediation, as required, for the protection and restoration of groundwater resources.

Groundwater monitoring wells within Parcel C are required as part of the site-wide groundwater investigation, monitoring and remediation program, therefore, you are required to maintain all wells. BRC may remove specific monitoring wells with the prior approval of the Executive Officer.

Please call Mr. John Geroch at (213) 576-6737 or Dr. Rebecca Chou at (213) 576-6733 if you have any questions.

Sincerely,

Dennis A. Dickerson
Executive Officer

Attachment: OEHHA Memorandum

cc: Cheryl Ross, Central Basin Municipal Water District
Ted Johnson, Southern California Water Replenishment District
Jeff Nagler, Watermaster – California Department of Water Resources
Jose Reynoso, Los Angeles County Department of Health Services, Water Well Permits/Well Abandonment
Tim Smith, Los Angeles County Department of Public Works, Environmental Programs Division, Underground Storage Tanks
Captain David Soto, Los Angeles City Fire Department, Underground Storage Tank Department
Scott Zachary, Haley & Aldrich

Objectives of the Proposed Screening Risk Assessment

The objective of the screening risk assessment (SRA) is to provide health risk estimates associated with potential exposure to residual site-related chemicals of potential concern (COPCs) in soil and groundwater within Parcel C property boundary, and based on existing conditions after completion of site investigation, demolition, remedial excavation, remediation confirmation sampling, and grading activities.

The SRA follows the approach proposed in the Workplan, previously reviewed by the Office of Environmental Health Hazard Assessment (OEHHA). Boeing and Haley & Aldrich further explained some issues described in the Workplan in recent telephone conferences.

Soil contamination

Soil was sampled and analyzed for metals, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and soil gas VOCs contaminants. According to the Report, 233 known and suspected potential source areas were investigated. Soil borings were drilled from the surface to 65 feet (ft) below ground surface (bgs) and approximately 5,900 soil samples and post demolition confirmation samples were collected from over 1,200 distinct locations. A total of 169 soil gas samples were also collected at the site. A step-out/step-down method was used to delineate the contamination, by comparing the latest analytical result to previously developed soil gas screening concentrations (SGSCs) or soil field action levels (SFALs). This procedure was described in the Workplan and is appropriate.

For metals, the concentration of each metal identified on site was compared to the facility-specific background concentration. Metal COPCs considered in the SRA are all those exceeding background, plus Cr (+6) and cyanide. In shallow soil (0-12 ft bgs) 37 VOCs and 34 SVOCs were identified. In deep soil (>12 ft bgs), there were 37 VOCs identified (5 different from those in shallow soil), 25 of the SVOCs detected in shallow soil, and 10 soil gases.

Two areas of TCE contamination in soil were defined (shown in Figures 8 to 32). One, under Buildings 1 and 36 ("Building 1+36"), extends to the north of Parcel C extending to at least 50 ft bgs with a reported maximum TCE of 97,000 µg/kg at 20-25 ft bgs. Another plume extends under Building 2 with a reported maximum TCE of 82,000 µg/kg at 50 ft bgs. The TCE plume under Buildings 1+36 is co-contaminated with 1,1,1-TCA and toluene. Soil shows contamination with toluene extending to at least 60 ft bgs with a reported maximum of 1,400,000 µg/kg, and 1,1,1-TCA extending to at least 60 ft bgs with a reported maximum of 5,200,000 µg/kg. The organic contaminants detected in soil, groundwater, and soil gas are presented in Table A-2, with the following maximum concentrations: 20,000,000 µg/kg of methylene chloride, 8,700,000 µg/kg of Methyl-Ethyl-Ketone, 1,300,000 µg/kg of 4M2P, 3,700,000 µg/kg

considered not suitable for water supply purposes, and therefore exposure assessment does not include the drinking water pathway, however it is assessed as a contaminated water body acting as a source of hazardous contaminants.

Groundwater contamination is shown graphically in Figure 30 for TCE, and in Figure 31 for 1,1-DCE. A Summary of Organic Chemicals Concentrations in soil, groundwater and soil gas showing six organic contaminants (acetone, MEK, 4M2P, styrene, 1,2,4-TMB, and 1,3,5-TMB) in groundwater is shown in Table A-2. Vinyl chloride, a common degradation product of 1,1,1-TCA, PCE, and TCE, and recognized human carcinogen, was not detected in soil gas or in ground water at Parcel C. The authors explained that the soil vapor extraction system was not running at the time of the soil matrix or soil gas sampling and therefore soil gas concentrations could not have been affected by the system.

In the risk assessment, all metals exceeding the site-specific background, and all detected VOCs and SVOCs in groundwater were considered COPCs.

Migration and Exposure Pathways and Conceptual Site Model

The Conceptual Site Model (CSM) shown in Table A-4 is appropriate and relies on current sampling and analysis for contamination, instead of modeling migration and fate. The CSM however does not discuss the *temporal* component of the migration and exposure pathways. A currently incomplete or insignificant exposure pathway may become complete or significant in the future because of migration of contaminants. Therefore the definition used in the Report for incomplete or insignificant pathways are applicable only if the fate and migration pathways are mitigated, that is, assuming contaminant remediation.

Exposure Point Concentration

All samples representing current soil conditions and taken from shallow soil (0 to 12 feet bgs), plus any soil from deeper zones that had been brought to the surface during excavation, were included in the risk assessment. Examples of spreadsheets with raw data showing calculation of exposure point concentration (EPC) for arsenic and benzo[a]pyrene were provided by Boeing and Haley & Aldrich. The calculations were verified and the results are correct.

The statistical method for estimating the 95 percent upper confidence of the arithmetic mean (95 percent upper confidence limit (UCL)) for normally- or lognormally-distributed data was discussed and are appropriate. The authors used the H-statistics method, a method that is sensitive to variance and group size, and hence its robustness has been questioned in the scientific literature. In my opinion this topic is not an issue external to the present project. Results of benzo[a]pyrene analysis span four orders of magnitude (min=0.42; max=6100) and

The selection of receptors of interest for future exposure scenarios is appropriate, including exposure pathways of potential concern. However the Report does not discuss exposure among on-site demolition and remediation workers. It is unclear whether exposure was deemed insignificant, although direct skin contact with soil, and inhalation of VOCs and resuspended soil may be significant during this stage.

The San Diego County Site Assessment and Mitigation (SAM) Manual vapor transport and risk calculation model was used to estimate the vapor intrusion of subsurface VOCs into indoor air. This model is simpler than the Johnson and Ettinger model, and is useful for screening purposes.

In this SRA, the future on-site industrial worker would be subject to the highest levels of exposure for the longest time, and therefore can be used as a surrogate receptor for all other receptors. The proposed exposure pathways and exposure factors for this receptor are reasonable and supported.

According to Section A.5.2, Intake Assumptions, exposure among future on-site industrial worker was estimated as follows:

- Ingestion of soil, inhalation of particles and vapors in outdoor air, and dermal contact with soil, were estimated using the industrial U.S. Environmental Protection Agency (EPA) Region 9 preliminary remediation goals (PRGs) adjusted for California toxicity criteria.
- Inhalation of VOCs in indoor air was estimated using the SAM approach.

The health risk calculations were conducted using results of analysis of confirmation samples taken after excavation to verify that no further remediation is necessary.

Target risk levels

The Office of Environmental Health Hazard Assessment (OEHHA) does not propose or approve target risk levels. This risk management decision belongs to the RWQCB-LA. OEHHA only verifies that the proposed approach is reasonably protective of human health and that the methods and procedures used in the risk assessment are scientifically justified and acceptable to the State. For example, Integrated Risk Assessment Section (IRAS)/OEHHA verifies that the reported estimated risk values reflect the cumulative health risks resulting from all residual contaminants and exposure pathways in the exposure scenario under the current site conditions.

lifetime cancer health risk of 4.6×10^{-6} is within National Contingency Plan range for risk decision-making and the combined hazard index of 0.9 suggests that adverse non-cancer health effects are unlikely. As long as the nature and severity of the contamination is as characterized, it can be expected that even small variances from the determined variables should not be cause for concern among people working in this area.

The communication and assistance provided by Boeing and Haley & Aldrich work team as well as from the RWQCB-LA throughout the conduct of this health risk assessment is acknowledged.

I appreciate the opportunity to work on this project.